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## SOME TECHNIQUES FOR THE REARING OF MEGATHYMUS LARVAE

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DURING THE PAST FIVE YEARS the authors have successfully reared to adults approximately 400 larvae of the genus *Megathymus*. About 75 of these larvae have been reared from very early instars. With the exception of four larvae of *Megathymus coloradensis navajo* Skinner, all of our rearings have been accomplished under controlled environmental conditions indoors. The rearing of such large numbers of larvae indoors has led us to adopt certain techniques whereby we would be assured of perfect adults and, at the same time, enable us to make observations on the behavior of the larvae.

All of the *Megathymus* larvae reared by us are borers in the caudices of various species of *Yucca*. Our rearings include the following *Megathymus* subspecies: *Megathymus coloradensis arizonae* Tinkham; *Megathymus coloradensis navajo* Skinner; two un-named populations of *Megathymus coloradensis*; *Megathymus ursus ursus* Poling, and *Megathymus ursus deserti* Wielgus, Wielgus and Wielgus. Each of the preceding subspecies has its own larval peculiarities, as well as similarities, and the species of *Yucca* involved will also suggest certain avenues of approach towards a successful rearing.

The greatest problem confronting the rearer of *Megathymus* larvae is the preservation of the foodplants in a wholesome condition throughout larval development. Loss of plant moisture, and the subsequent desiccation of the larvae, must be prevented or reduced over a time period which may approach six months in some subspecies. The basic problem does not change with feeding larvae, though, with later instars, the period involved for the retention of plant moisture is reduced.

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Fig. 1.—Inducing *Megathymus* larva to vacate burrow by prodding with a broom straw.

*Megathymus* larvae are collected *in situ* by removing the infested *Yucca* caudices from the ground. The caudices are placed in ordinary corrugated cardboard cartons in the field, labeled with significant collecting data, and are transported back to the laboratory with no further treatment enroute. Upon arrival at the laboratory, each section of *Yucca* caudex is prepared so as to retain vital pup moisture and succulence. Ideally, the caudex should be prepared so as to remain viable throughout the larva's development but this is not always possible. We have used the following techniques successfully, but each technique used is determined subjectively, considering the *Yucca* species, the condition and size of the caudex removed, and the anticipated larval period.

No matter how long or short the larval feeding period, every section of the *Yucca* caudex is bagged in a polyethylene plastic bag which is tied, or taped, tightly to the upper end so as to prevent loss of moisture. Since there are so many variables involved, each technique presented herein is subject to some modification on an individual basis and we try to be as flexible and as innovative as the situation demands.

1. Caudices of *Yucca baccata* Torrey remain viable, and may take root, if first encased in damp pine sawdust or peat moss. We have also wrapped the caudices with ordinary newspapers soaked in tap water, then bagged with the plastic bags. Water is added as required. There is always the danger of rotting of the caudices with this technique.

2. If the larval period does not exceed four months, or if the caudex is medium-sized, wrapping with aluminum foil, then bagging in plastic, is a highly satisfactory treatment. The caudices remain in surprisingly good condition with this technique and are not prone to rotting. This is our preferred technique for the caudices of *Y. baccata* and *Yucca schottii* Engelman.

3. When the caudex is small and a larval transfer certain within a month's time, or if the caudex is very large, bagging only with the polyethylene plastic bag is sufficient. The disadvantage with this technique is the promotion of mold on the caudex.

In the rearing of *Megathymus* larvae, it is inevitable that some will have to be transferred to fresh, or larger, sections of caudices to complete their development. Two problems confront the rearer in such a situation: a) the safe removal of the larvae from the old caudices and, b) the establishment of the larvae



Fig. 2.—Transferred *Megathymus* larva established on fresh *Yucca* caudex by means of an artificial "tent" of rolled paper.

in the new caudices. Removal of a larva is initiated by exposing the burrow as close to the larva as possible without inflicting injury. In some cases, the caudex may disintegrate below the larva thereby making the removal process easier.

After the larva is exposed in the burrow, it is induced to vacate by gently prodding the far extremity with a broom straw. The straw is inserted between the larva and the burrow wall and a tickling motion is applied to the larva's extremity. This results in a gradual abandonment of the burrow by the larva. (See Fig. 1) Abandonment is accomplished even if the larva is reversed in the burrow provided that the broom straw tickles its far extremity.

The removed larva must now be re-established in the new caudex. Our first transfer attempts involved the larvae of *M. u. deserti* (Wielgus *et al.*, 1972) utilizing the vacated burrows of *M. c. navajo*. This technique was soon abandoned in favor of an artificial "tent" affixed to the fresh caudex. The artificial tent consists of a rolled tube of paper 2 inches long by 7/16 inch in diameter. A thin slice is taken out of the caudex, exposing the succulent pulp, and the paper tube is affixed over the slice using insect pins. The larva is introduced to the tube opening and allowed to make its way in. It will subsequently close the open tube end with silk, leaving a small hole for defecation, and proceed to bore slowly into the caudex. (See Fig. 2) With the larvae of *ursus*, the tubes are removed after about two weeks have elapsed.

All *Yucca* caudices containing larvae are stored in corrugated cardboard cartons labeled with collecting and rearing data. Those cartons containing larvae requiring chilling and a period of diapause are placed outdoors in shade at the necessary time; the larvae of *ursus* feed on through without diapausing.

Mature diapausing larvae (either reared or field-collected) ready for pupation are reintroduced to higher indoor temperatures while still in the caudices. Each pupa obtained is removed by pulling off the tent and inverting the caudex, thus allowing the pupa to drop out easily into one's open palm. The pupae are then stored in upright rolled paper tubes, 2 inches long by 7/16 inch in diameter, cemented to the inside bottom of corrugated cardboard cartons with sides three inches high. The tubes are spaced 2½ inches on center. The authors utilize cartons accommodating 24 tubes each. Each carton is labeled with corresponding significant data. Since *Megathymus* pupae are highly mobile, the open ends of the tubes are crimped

inwards slightly so as to prevent the pupae from working out. We are now introducing mature larvae directly into the paper tubes, thereby eliminating the problem of storage space for bulky caudices. So far, no problems have developed with this method and the larvae have pupated directly in the tubes.

At an indoor temperature of 75-80 degrees Fahrenheit, pupal duration varies from 21 to 26 days. Up to twenty adults may eclose on a single day. Since the senior author is engaged in a profession requiring his absence from the laboratory during a greater part of the day, a method had to be devised to keep the newly-eclosed adults inactive prior to killing. This was accomplished by covering the cartons with stiff sheets of black construction paper which allowed no light within. In total darkness, the adults will remain quiescent for several hours, which is sufficient for their disposal at the author's convenience.

Each adult is immobilized by pinching the thorax with forceps. It is then dropped into a paper drinking cup bearing data associated with it, including date of emergence, and killed by thorough freezing in the freezer compartment of a household refrigerator. Prior to spreading, each adult is defrosted as needed, care being exercised so as not to jar the paper cup containing the brittle, frozen specimen.

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#### LITERATURE CITED

- DOS PASSOS, C. F., 1964. A synonymic list of the Nearctic Rhopalocera. *Lepid. Soc. Mem.*, No. 1, New Haven, Conn. v + 145pp.
- FREEMAN, H. A., 1969. Systematic review of the Megathymidae. *J. Lep. Soc.*, 23, Supplement 1, 58pp, 1 pl.
- WIELGUS, RONALD S., JOSEPH R. and DALE, 1970(1971). Additional notes on the distribution and foodplant preferences of *Megathymus coloradensis navajo* Skinner. *J. Res. Lepid.* 9(3):169-174.
- , 1972. A new subspecies of *Megathymus ursus* Poling from Arizona with observations and notes on its distribution and life history. *Bull. Allyn Mus.* 9:1-11.